REMARKS

In the Response to the April 4, 2001 Office Action, filed with the Office July 3, 2001, Claims 57-64, 68-73 and 75 were canceled. Inadvertently, Applicant omitted Claim 76 from this list of claims to be canceled. Therefore, Claim 76 is canceled without prejudice at this time. As a result, the objection and rejection of such claim in the present Office Action is made moot.

Applicant notes the Examiner's renumbering of Claim 78 to be Claim 77 and formally provides such amendment herein. In addition, Claims 65-67 and 74 are also amended. Further, Applicant has added Claims 78-85. Claims 78-85 recite, in pertinent part, a platinum alloy layer which is found in the specification at page 7, lines 7-12. Therefore such new claims do not add new matter. It follows then that Claims 65-67, 74 and 77-85 are pending in the instant application. Examination of such claims in view of the remarks herein is requested.

Applicant respectfully requests that the Examiner indicate in the next action whether or not the drawings for this application, submitted October 19, 1999, have been approved. For example, such can be indicated by marking the appropriate box for item 10 on the Office Action Summary Form, PTO-326.

Rejections under 35 U.S.C. §103

Aoki in view of Park

Claims 65-67 and 77 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Aoki et al. (PN 6,033,953, of record) (hereinafter "Aoki") in

view of Park et al. (EP 08557382A2, of record) (her inafter "Park"). Applicant traverses.

Referring first to Claim 65, such claim recites, in pertinent part:

> a roughened platinum layer over the substrate, the roughened platinum layer having a continuous surface characterized by columnar pedestals that are at least about 300Å tall; and
>
> an intervening layer between the platinum layer and the substrate, the intervening layer comprising at least one of IrO_2, RuO_2, RhO_2, or OsO_2.

The Examiner contends that Aoki's layer 38 corresponds to Applicant's recited roughened platinum layer. Applicant respectfully asserts that the Examiner is mistaken. Referring to Aoki's Fig. 2a and 2b, it is taught that layer 38 is formed by electropolishing a vapor deposited platinum layer. The initially formed upper surface of such layer is the "saw-tooth" representation of Fig. 1A (see, col. 4, lines 5-13) which Aoki teaches "is due to the fact that particles of Pt adhere in a conical shape from sputtering or vapor deposition" (col. 1, lines 55-56). Therefore, Aoki DOES NOT teach or even suggest that the claimed roughened platinum layer characterized by columnar pedestals.

With regard to Park, the Examiner alleges that such reference teaches an intervening 104 that corresponds to the intervening layer recited in Applicant's Claim 65. The Examiner's allegation is incorrect. Park teaches an intervening layer, referred to by Park as a functional intermediate film, that can be an insulating laver, a conductive plug layer, a diffusion barrier layer or an adhesion or glue layer (col. 5, lines 37-40). For each of these several functions, Park recites a list of appropriate materials (see, col. 5, line 42 - col. 6, line 5). None,

of these several lists include or even suggest th metal oxides recited in Applicant's Claim 65.

It is well established that for a rejection under §103, the Examiner must show that each of the elements recited in a claim are taught or suggested by the cited references. Here, Aoki is shown NOT to teach or suggest the recited platinum layer characterized by columnar pedestals and Park is shown NOT to teach the recited metal oxides. Since each reference fails to teach or suggest at least one element of the claimed subject matter, it is inconceivable that any combination of such art can be held as making the instant claim obvious. It follows then that the rejection of Claim 65 is INCORRECT and must be withdrawn. Action to this effect is requested.

Claims 66, 67 and 77 depend from Claim 65. Hence for at least the same reason provided above, the rejection of such dependent claims must also be INCORRECT. Withdrawal of these rejections is also requested. In addition, Applicant has provided new Claim 85 depending from Claim 65. While such claim is not rejected at this time, Applicant asserts that for the reasons presented above, a rejection of such new claim as obvious over Aoki and Park as alleged for Claim 65, would be improper.

Aoki in view of Liu

Claims 74 and 76 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Aoki et al. (PN 6,033,953, of record) (hereinafter "Aoki") in view of Liu et al. (PN 6,175,129) (hereinafter "Liu"). Claim 76 has been cancelled, therefore the rejection of this claim is moot. Applicant traverses with regard to Claim 74.

Claim 74 recites, in pertinent part, that:

> at least one of the first and second capacitor electrodes comprise roughened platinum, the roughened platinum having a continuous surface characterized by columnar pedestals

As above, the Examiner alleges that Aoki teaches Applicant's platinum layer characterized by columnar pedestals. However, Applicant has demonstrated that such an allegation is INCORRECT. Rather, Aoki teaches that PT films formed by sputtering and/or vapor deposition are characterized by conical forms that adhere to the substrate during the forming of the platinum layer.

Liu while directed to semiconductor capacitor structures, is silent with regard to the use of platinum or platinum alloys for such structures. Therefore, it is not possible for a combination of Aoki and Liu to teach or even suggest the capacitor electrodes recited by Applicant's Claim 74. It follows then that the rejection of Claim 74 is in error and must be withdrawn, which action is earnestly sought.

Applicant has added Claims 78-85. Claim 85 depending from Claim 65 and such claim is discussed above. With regard to Claims 78-84, Claim 78 is an independent claim from which Claims 79-84 depend. Claim 74 recites, among other things:

> a platinum alloy layer disposed over the first layer, the platinum alloy layer characterized by a continuous, roughened outer surface, where the platinum alloy layer comprising platinum and at least one of rhodium, iridium, ruthenium, palladium, osmium or silver.

Applicant respectfully asserts that since none of the currently cited art teaches or even suggests a platinum alloy layer as recited in Claim 78, such

claim and th claims depending therefrom are in allowable form. Action to this effect is requested.

As In summary, Applicant having responded to each of the rejections, respectfully asserts that Claims 65-67, 74 and 77-85 are in condition for allowance. Action to that effect is earnestly sought. If, however the Examiner's next action is anything other than a Notice of Allowance, the Examiner is requested to call the undersigned to schedule a telephonic interview. The undersigned is available during normal business hours, Pacific Coast Time.

Respectfully submitted,

Dated: Jan 3, 2002

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Serial No. 09/421,625
Filing Date ..... October 19, 1999
Inventor ..... E. Marsh
Assignee ..... Micron Technology, Inc.
Group Art Unit 2811
Examiner ..... H. Vu
Attorney's Docket No. MI22-1284
Title: Circuitry and Capacitors Comprising Roughened Platinum Layers

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING RESPONSE TO OCTOBER 3, 2001 OFFICE ACTION

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

65. (Amended) An integrated circuit comprising:

a monocrystalline silicon substrate;

a roughened platinum layer over the substrate, the roughened platinum layer having a continuous surface characterized by columnar pedestals that are at least about 300Å tall; and

an intervening layer between the platinum layer and the substrate, the intervening layer comprising at least one of ~~iridium, rhodium, ruthenium, platinum, palladium, osmium, silver, rhodium/platinum alloy,~~ IrO_2, RuO_2, RhO_2, or OsO_2.

66. (Amended) The circuit of Claim 65 wherein the columnar pedestals terminate in dome-shaped tops.

67. (Amended) The circuit of Claim 65 wherein the columnar pedestals terminate in hemispherical tops.

74. (Amended) A capacitor comprising:

a first capacitor electrode over a monocrystalline silicon substrate;

a second capacitor electrode;

a dielectric layer between the first and second capacitor electrodes;

wherein ~~both~~ at least one of the first and second capacitor electrodes comprise roughened platinum, the roughened platinum having a continuous surface characterized by columnar pedestals having heights greater than or equal to about one-third of a total thickness of the roughened platinum.

Cancel Claim 76

77. ~~78.~~ (Amended) The integrated circuit of claim 65 wherein the roughened platinum layer has a thickness of at least about 400Å, and less than about 600Å.

Add new Claims 78-85

78. (New) An integrated circuit comprising:

a semiconductive substrate;

a conductive node location disposed within the semiconductive substrate;

a first layer disposed over the semiconductive substrate and in electrical contact with the conductive node, the first layer comprising at least one of iridium, rhodium, ruthenium, palladium, osmium, silver, alloy, IrO_2, RuO_2, RhO_2, or OsO_2; and

a platinum alloy layer disposed over the first layer, the platinum alloy layer characterized by a continuous, roughened outer surface, where the platinum alloy layer comprising platinum and at least one of rhodium, iridium, ruthenium, palladium, osmium or silver.

79. (New) The integrated circuit of Claim 78 where the roughened platinum alloy layer has a thickness of at least about 400Å, and less than about 600Å.

80. (New) The integrated circuit of Claim 78 where the roughened platinum alloy layer has a thickness of at least about 400Å, and less than about 1000Å.

81. (New) The integrated circuit of Claim 78 where the roughened platinum alloy layer has a thickness of about 400Å or less.

82. (New) Th integrated circuit of Claim 78, where the roughened platinum alloy layer comprises columnar pedestal structures having heights greater than or equal to about one-third of a total thickness of the roughened platinum alloy layer.

83. (New) The integrated circuit of Claim 82, the columnar pedestal structures having heights of at least 300Å.

84. (New) The circuit of Claim 82 wherein the columnar pedestals terminate in dome-shaped tops.

85. (New) The integrated circuit of Claim 65, where the roughened platinum layer comprises a platinum alloy comprising platinum and at least one of rhodium, ruthenium or palladium.